Principles and effects

Principle	Description
Modality principle	Learning will be enhanced if presenting **textual information in an auditory format**, rather than in visual format, when it is accompanied with other visual information like a graph, diagram or animation.[1]
Redundancy principle	Capacity of both human information channels can unnecessarily be **overloaded by redundant information** presented through both channels thereby negatively affecting learning process.[2]
Split-attention effect	"*when each source of information is essential for understanding the represented subject matter, learning improves when multiple sources of information are presented in a spatially and temporally integrated rather than separated format.*"[3] Split attention effect can here be interpreted as *spatial* or *temporal* resulting in spatial and temporal contiguity effect.
Spatial contiguity principle	Information processing is easier when two related visual information **sources are closer to one other**. For example, text placed near the referred place in the diagram will result in more successful learning than if it is placed under the diagram.
Temporal contiguity principle	**Simultaneous presentation** of related information should be most similar to the way human mind operates and has provided good experimental results, same as presenting related multi-modal information with very short time differences.
Coherence principle	(Also called *seductive details effect*) claims that **extraneous material** that may be interesting or motivating but is irrelevant and generally **wastes learning resources**.
Individual differences principle	It emphasizes influence of prior knowledge and cognitive capacity to results of learning. Design effects are stronger for learners with little prior knowledge, and for high-spatial learners who have higher cognitive capacity to mentally integrate verbal and visual information.

Some of the effects and learning aids researched also in frames of cognitive theory of multimedia learning and cognitive load theory are:

Effect	Description	
Signaling effect	(*Signaling* or *cuing*) presents the increase in the learning outcomes due to promotion of attention to relevant information. Signals are based on natural attention attractors like movement or contrast. In multimedia this can also be achieved through underlining, arrows or color-coding.[4]	
Segmenting effect	Learning should be more efficient if a continued animation or narration could be split into more smaller parts.[5]	
Worked examples effect[6]	The reduction in imposed cognitive load due to "*… a step-by-step **demonstration** of how to perform a task or how to solve a problem.*"[7]	
Expertise reversal effect[8]	"*Instructional techniques that are highly effective with inexperienced learners can lose their effectiveness and even have negative consequences when used with more experienced learners.*"[9]	
Explanation prompts[10]	Prompting students to self-explain steps of a worked example or a procedure they're studying has a positive effect on conceptual knowledge.[11]	

Effect	Description
Collaborative learning	When the complexity of the material to be learned is low, individual learning is more effective and more efficient than collaborative. For complex materials, collaborative learning is superior since it allows sharing working memory load among participants.[12]
Schema activation	"*Activation and utilization of learners' prior knowledge.*"[13]
Learner control	"*Too much control causes cognitive overload and even experts might experience difficulties in selecting, sequencing and pacing huge amounts of information.*" [14]

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